

REMARKS

Claims 1, 2, 4-6, 8-12, 16-19, and 23-25 are amended, claims 7 and 26 canceled, and claims 27 and 28 added herein. Upon entry of this amendment, claims 1, 2, 4-6, 8-20, 23-25, 27, and 28 will be pending in the above-identified application.

Applicant appreciates the courtesies extended during the telephonic interview conducted on March 8, 2006, between the Examiner and Applicant's undersigned attorney.

Claims 1, 2, 4-6, 8-20, and 23-25

Applicant respectfully requests reconsideration of the rejection of claims 1, 2, 4-6, 8-20, and 23-25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,952,526 (Pribat) or U.S. Patent No. 6,294,440 (Tsuda) in view of U.S. Patent No. 5,672,520 (Natsume).

Claims 1, 2, 4-6, and 11-20

As amended, each of claims 1, 2, 4-6, and 11-20 recites forming a first III-V nitride pattern in one position in the crystal in a direction of a thickness of the crystal, the first pattern including a plurality of first elements distributed in a lateral direction with respect to the crystal at a pitch, each of the first elements forming an elongate stripe extending in a longitudinal direction that is substantially orthogonal to the lateral direction and each of the first elements having at least one width measured in the lateral direction, and forming a second III-V nitride pattern in another position in the crystal in the direction of thickness, the second pattern including a plurality of second elements distributed in the lateral direction with respect to the crystal at a pitch, each of the second elements forming an elongate stripe extending in the longitudinal direction and each of the second elements having at least one width measured in the lateral direction, wherein the pitch of the first pattern and the pitch of the second pattern are different, and wherein the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different pitches of the first pattern and the second pattern.

Pribat discloses a method of making a semiconductor including first insulation bands (20, 21 and 22) and second insulation bands (40, 41 and 42), wherein

the respective bands have equal pitch across the device, as seen for example in Figs. 7-9, and do not include a III-V nitride. Tsuda discloses a method for making a semiconductor wherein respective masks (102, 104) have equal pitch across the device, as seen for example in Figs. 1-3, and do not include a III-V nitride. Natsume discloses a method of checking alignment accuracy in a photolithographic step. Alignment check patterns 10, 20 in Natsume are part of a photomask and not part of the crystal as presently claimed. In addition, the alignment check patterns 10, 20 of Natsume do not include a III-V nitride.

Pribat, Tsuda, and Natsume, individually and in any combination, fail to show or suggest forming a first III-V nitride pattern in one position, the first pattern including a plurality of first elements distributed in a lateral direction with respect to the crystal at a pitch, each of the first elements having at least one width measured in the lateral direction, and forming a second III-V nitride pattern in another position in the crystal, the second pattern including a plurality of second elements distributed in the lateral direction with respect to the crystal at a pitch, each of the second elements having at least one width measured in the lateral direction, wherein the pitch of the first pattern and the pitch of the second pattern are different, and wherein the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different pitches of the first pattern and the second pattern. Therefore, the Section 103 rejection is improper and should be withdrawn.

During the interview on March 8, 2006, the Examiner agreed with Applicant that the references do not appear to show patterns as claimed including III-V nitride and that the Natsume reference should be removed as a reference if Applicant amended the claims to clarify that the first pattern and the second pattern are III-V nitride patterns. Claim 1, 2, 4-6, and 11-20 recite the first pattern and the second pattern are nitride III-V patterns.

Further, Natsume teaches away from the present invention. Section 2141.02 of the M.P.E.P. states, "(a) prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." One of the primary benefits of the present invention is the ability to make a high quality crystal where dislocations do not reach the crystal without costly checking

of alignment of relative mask patterns. (see e.g., page 14, lines 2-6; page 30, lines 2-10; page 6, lines 12-15; and page 3, lines 3-6). The *entire* purpose of Natsume is alignment accuracy, a requirement which the present invention obviates by including elements that partly overlies and partly do not overlies each other due at least in part to pitch differences between the elements.

Further regarding claim 4, the Office action asserts it would have been obvious to modify the combination of Tsuda and Natsume or Pribat and Natsume to select any proportion of pitches to produce a desired alignment. The Office action's assertion is flawed because the given motivation is in error. Because the purpose of Natsume is to achieve perfect alignment/overlap (see e.g., column 3, lines 58-65), any adjustments to the pitches of Natsume would be made to obtain better alignment/overlap. The relationship between pitches recited in present claim 4 is tailored to achieve the specific result of obtaining one or more *non-overlapping* regions (see page 14, lines 7-17), not to achieve better/more overlap. Thus, it would not have been obvious to adjust the pitches of Natsume to match the claimed relationship because the result the relationship is tailored toward is quite different from any result adjusting the pitches of Natsume would be tailored toward.

The two immediately preceding paragraphs describe the manner in which Natsume teaches away from the present invention. Because Natsume teaches away from the claimed invention and the references do not show or suggest the claimed relationship, a *prima facie* case of obviousness has not been made.

Further regarding claim 5, the references, individually and in any combination, fail to show or suggest at least one of the first and second patterns having pattern elements arranged in a plurality of different pitches measured in the lateral direction with respect to the crystal. The Office action asserts that Natsume discloses a pattern having a plurality of pitches because the pattern elements 13, 14 have different lengths, which meet the claim recitation because width and length are merely different based on perspective and the width is not defined. See Office action, page 6, lines 3-6. As amended, the claims clearly define the width and pitch. For example, claim 5 recites pitches measured in the *lateral* direction with respect to the crystal and claim 1, which claim 5 depends from, recites that each pattern includes a plurality of elements distributed in the *lateral* direction and forming stripes extending in a *longitudinal*

direction perpendicular to the *lateral* direction and each of the elements has at least one width measured in the *lateral* direction.

Further regarding claim 6, the references, individually and in any combination, fail to show or suggest the second pattern has at least *three* different pitches measured in a lateral direction with respect to the crystal.

Further regarding claim 16, the references, individually and in any combination, fail to show or suggest forming the first pattern directly on the basal body with a base layer between and selectively etching the base layer using the first pattern as a mask. The Office action (in lines 15-19 of page 6) states the references disclose "etching and using a masking material" and that etching through a dielectric layer will inherently including etching the underlying base layer. However, Pribat fails to show forming the first pattern 20, 21, 22 directly on the basal body 1 with a base layer between and it is not clear what the Office action is considering the recited base layer in Pribat. Tsuda fails to show or suggest etching the GaN layer 101 and it would not have been obvious to one skilled in the art to selectively etch the GaN layer of Tsuda from viewing the references. The Office action's apparent rational that accidental and unintended etching of the GaN layer may occur when etching the SiO₂ mask 102 is inaccurate because the reference clearly discloses etching away only the SiO₂ layer to form SiO₂ stripes. See column 7, lines 41-45. Natsume also does not show or suggest forming the first pattern directly on the basal body with a base layer between and selectively etching the base layer using the first pattern as a mask. Because the references, individually and in combination, fail to show or suggest forming the first pattern directly on the basal body with a base layer between and selectively etching the base layer using the first pattern as a mask, the rejection is improper and should be withdrawn.

Further regarding claim 17, the references, individually and in any combination, fail to show or suggest forming an intermediate layer as part of the crystal on one of the surfaces of the basal body and on a surface of the base layer with the first pattern formed thereon, forming the second pattern on a surface of the intermediate layer, depositing a top layer on the surface of the intermediate layer with the second pattern formed thereon, selectively etching the intermediate layer using the second pattern as a mask, and removing the masking material of the second pattern between

the second pattern formation step and the second growth step. Regarding claims 16-19, the Office action (in lines 15-19 of page 6) states, the references teach etching and using a masking material. However, Pribat fails to show forming an intermediate layer, etching the intermediate layer using the second pattern as a mask, and removing the masking material of the second pattern, as claimed. It is not clear what the Office action is considering the recited intermediate layer in Pribat or how Pribat discloses etching the intermediate layer using the second pattern as a mask or removing the masking material of the second pattern. Tsuda fails to show or suggest etching the GaN crystal film 103 and it would not have been obvious to one skilled in the art to selectively etch the film from viewing the references. The Office action's apparent rationale that accidental and unintended etching of the GaN crystal film 103 may occur when etching the SiO₂ mask 104 is inaccurate because the reference clearly discloses etching away only the SiO₂ layer to form SiO₂ stripes. See column 7, line 64, to column 8, line 4. Natsume also does not show or suggest forming an intermediate layer as part of the crystal on one of the surface of the basal body and on a surface of the base layer with the first pattern formed thereon, forming the second pattern on a surface of the intermediate layer, depositing a top layer on the surface of the intermediate layer with the second pattern formed thereon, selectively etching the intermediate layer using the second pattern as a mask, and removing the masking material of the second pattern between the second pattern formation step and the second growth step. Because the references, individually and in combination, fail to show or suggest forming an intermediate layer as part of the crystal on one of the surface of the basal body and on a surface of the base layer with the first pattern formed thereon, forming the second pattern on a surface of the intermediate layer, depositing a top layer on the surface of the intermediate layer with the second pattern formed thereon, selectively etching the intermediate layer using the second pattern as a mask, and removing the masking material of the second pattern between the second pattern formation step and the second growth step, the rejection is improper and should be withdrawn.

Further regarding claims 18 and 19, the references, individually and in any combination, fail to show or suggest forming the first pattern (claim 18) or forming the second pattern (claim 19) by forming respective indentations. The Office action states that Pribat shows the claimed features by disclosing removing material between

apertures. See Office action, page 3, lines 10-16. However, the removal of material between the apertures 43, 44, 45 to form voids does not form the first pattern of Pribat, the dielectric 20, 21, 22 forms the first pattern in Pribat. The removal of material between the apertures 43, 44, 45 to form voids also does not form the second pattern of Pribat, the dielectrics 40, 41, 22 form the second pattern. In Pribat, the material is removed for growing material in the void to form a thin layer between the two dielectric patterns and not to form the patterns. See column 11, lines 44-53. In one part (lines 16 and 17 of page 3), the Office action, regarding claims 18 and 19, apparently asserts the structure of Fig. 14 of Pribat is relevant to the claimed formation of the first and second plurality of patterns by forming respective indentations. However, Fig. 14 of Pribat does not show or suggest forming the first pattern (claim 18) or forming the second pattern (claim 19) by forming respective indentations. In another part (lines 15-19 of page 6), regarding claims 16-19, the Office action states, the references teach "etching and using a masking material." However, claims 18 and 19 recite forming the first pattern and forming the second pattern, respectively, by forming respective indentations, not simply etching using a masking material.

Claims 8-10

As amended, each of claims 8-10 recites a method of manufacturing a crystal of a III-V compound of a nitride system comprising forming a first pattern including a plurality of first pattern elements in a first position in the crystal, the first pattern elements being distributed in a lateral direction with respect to the crystal and in a longitudinal direction with respect to the crystal that is substantially orthogonal to the lateral direction so that a space separates each set of adjacent first pattern elements of the plurality of first pattern elements in the lateral direction and in the longitudinal direction, the first pattern having a lateral pitch measured in the lateral direction and a longitudinal pitch measured in the longitudinal direction that is substantially the same as the lateral pitch, and forming a second pattern including a plurality of longitudinal pattern elements extending in the longitudinal direction and a plurality of lateral pattern elements extending in the lateral direction to intersect the longitudinal pattern elements, the intersecting elements forming a plurality of spaces between them that are aligned in the lateral direction and in the longitudinal direction, the plurality of longitudinal elements having a pitch measured in the lateral direction and the plurality of lateral elements

having a pitch measured in the longitudinal direction that is substantially the same as the lateral pitch, wherein the pitches of the first and second patterns are different and the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different pitches.

Pribat discloses a method of making a semiconductor wherein respective first insulation bands (20, 21 and 22) and second insulation bands (40, 41 and 42) are distributed in a single direction (i.e., laterally). Tsuda discloses a method for making a semiconductor wherein respective masks (102, 104) are distributed in a single direction (i.e., laterally). Natsume discloses a method of checking alignment accuracy in a photolithographic step. Alignment check patterns 10, 20 in Natsume are part of a photomask and not part of the crystal as presently claimed.

Pribat, Tsuda, and Natsume, individually and in any combination, fail to show or suggest forming a first pattern including first pattern elements distributed in a lateral direction and in a longitudinal direction substantially orthogonal to the lateral direction so a space separates each set of adjacent first pattern elements in the lateral direction and in the longitudinal direction, the first pattern having a lateral pitch measured in the lateral direction and a longitudinal pitch measured in the longitudinal direction that is substantially the same as the lateral pitch, and forming a second pattern including a plurality of longitudinal pattern elements extending in the longitudinal direction and a plurality of lateral pattern elements extending in the lateral direction to intersect the longitudinal pattern elements, the intersecting elements forming a plurality of spaces between them that are aligned in the lateral direction and in the longitudinal direction, the plurality of longitudinal elements having a pitch measured in the lateral direction and the plurality of lateral elements having a pitch measured in the longitudinal direction that is substantially the same as the lateral pitch, wherein the pitches of the first and second patterns are different and the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different pitches.

Claims 23 and 24

As amended, each of claims 23 and 24 recites, among other things, a method of manufacturing a device by forming a device film on a surface of one of a crystal substrate and a crystal film, the device film having a light-emitting portion

including a cladding layer having a protrusion, a contact layer formed on the cladding layer only above the protrusion, and an electrode formed on the contact layer, wherein the light-emitting portion overlies a region of the crystal where the second pattern overlies the first pattern so that dislocations that may form in the crystal adjacent the basal body generally do not reach the light-emitting portion.

Pribat discloses a method for making a monocrystalline layer on an insulating material layer. See abstract. Tsuda discloses a method for producing a light emitting device including a cladding layer 112 and a contact layer 113. See Fig. 6 and column 11, lines 35-47. Natsume discloses a method of checking alignment accuracy in a photolithographic step. Alignment check patterns 10, 20 in Natsume are part of a photomask and not part of the crystal as presently claimed. The references, individually and in any combination, fail to show or suggest forming a light-emitting portion overlying a region of the crystal where the second pattern overlies the first pattern so that dislocations that may form in the crystal adjacent the basal body generally do not reach the light-emitting portion.

Because Pribat, Tsuda, Natsume and any combination of them fail to show or suggest the substance of claims 23 and 24, the rejection is improper. Accordingly, Applicant respectfully requests that the rejection be withdrawn.

Claim 25

As amended, claim 25 recites forming a first III-V nitride pattern in one position in the crystal in a direction of a thickness of the crystal, the first pattern including a plurality of first elements distributed in a lateral direction with respect to the crystal at a pitch, each of the first elements forming an elongate stripe extending in a longitudinal direction that is substantially orthogonal to the lateral direction and each of the first elements having at least one width measured in the lateral direction, and forming a second III-V nitride pattern in another position in the crystal in the direction of thickness, the second pattern including a plurality of second elements distributed in the lateral direction with respect to the crystal at a pitch, each of the second elements forming an elongate stripe extending in the longitudinal direction and each of the second elements having at least one width measured in the lateral direction, wherein the width measured in the lateral direction of at least one of the first pattern elements is different than the width measured in the lateral direction of at least one of the second pattern

elements, and wherein the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different widths of the first pattern and the second pattern.

Pribat discloses a method of making a semiconductor including first insulation bands (20, 21 and 22) and second insulation bands (40, 41 and 42) that do not include a III-V nitride. Tsuda discloses a method for making a semiconductor including masks (102, 104) that do not include a III-V nitride. Natsume discloses a method of checking alignment accuracy in a photolithographic step. Alignment check patterns 10, 20 in Natsume are part of a photomask and not part of the crystal as presently claimed. In addition, the alignment check patterns 10, 20 of Natsume do not include a III-V nitride.

Pribat, Tsuda, and Natsume, individually and in any combination, fail to show or suggest forming a first III-V nitride pattern in one position, the first pattern including a plurality of first elements distributed in a lateral direction with respect to the crystal at a pitch, each of the first elements having at least one width measured in the lateral direction, and forming a second III-V nitride pattern in another position in the crystal, the second pattern including a plurality of second elements distributed in the lateral direction with respect to the crystal at a pitch, each of the second elements having at least one width measured in the lateral direction, wherein the width of the first pattern and the pitch of the second pattern are different, and wherein the second pattern partly overlies and partly does not overlie the first pattern in the direction of the thickness of the crystal due at least in part to the different widths of the first pattern and the second pattern. Therefore, the Section 103 rejection is improper and should be withdrawn.

During the interview on March 8, 2006, the Examiner informed Applicant that the references do not appear to show patterns as claimed including III-V nitride and that the Natsume reference should be removed as a reference if Applicant amended the claims to clarify that the patterns are III-V nitride patterns. Claim 1, 2, 4-6, and 11-20 recite the first pattern and the second pattern are nitride III-V patterns.

Further, Natsume teaches away from the present invention. Section 2141.02 of the M.P.E.P. states, "(a) prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed

invention." One of the primary benefits of the present invention is the ability to make a high quality crystal where dislocations do not reach the crystal without costly checking of alignment of relative mask patterns. (see e.g., page 14, lines 2-6; page 30, lines 2-10; page 6, lines 12-15; and page 3, lines 3-6). The *entire* purpose of Natsume is alignment accuracy, a requirement which the present invention obviates by including elements that partly overlap and partly do not overlap each other due at least in part to pitch differences between the elements. Because Natsume teaches away from the claimed invention and the references do not show or suggest the claimed relationship, a *prima facie* case of obviousness has not been made.

Because Pribat, Tsuda, Natsume and any combination of them fail to show or suggest the substance of claims 1, 2, 4-6, 8-20, and 23-25, the rejection is improper. Accordingly, Applicant respectfully requests that the rejection be withdrawn.

CONCLUSION

As it is believed that the application is in condition for allowance, a favorable action and a Notice of Allowance are respectfully requested.

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Respectfully submitted,



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